SVKM's
D. J. Sanghvi College of Engineering

Program: B.Tech in Electronics & Telecommunication Engg **Academic Year: 2022** **Duration: 3 hours**
Date: 14.01.2023
Time: 10:30 am to 01:30 pm
Subject: Neural Network & Fuzzy Logic (Semester V) **Marks: 75**

(1) This question paper contains 2 pages.
(2) All Questions are Compulsory.
(3) All questions carry equal marks.
(4) Answer to each new question is to be started on a fresh page.
(5) Figures in the brackets on the right indicate full marks.
(6) Assume suitable data wherever required, but justify it.
(7) Draw the neat labelled diagrams, wherever necessary.

Question No.		Max. Marks
Q1 (a)	Name three strengths and three weaknesses of fuzzy expert systems OR What is the difference between the probability and fuzzy logic? Explain in detail.	[05] [05]
Q1 (b)	Describe how weight updating is done in Back Propagation Algorithm with the help of flowchart.	[10]
Q2 (a)	Three Fuzzy Sets are given as $\underset{\sim}{A} = \left\{\frac{0.25}{3} + \frac{0.32}{6} + \frac{0.19}{10} + \frac{0.9}{12}\right\}$ $\underset{\sim}{B} = \left\{\frac{0.1}{2} + \frac{0.2}{4} + \frac{0.7}{6} + \frac{0.9}{8} + \frac{1}{10} + \frac{0.2}{12}\right\}$ $\underset{\sim}{C} = \left\{\frac{0.5}{50} + \frac{0.7}{10} + \frac{0.9}{15} + \frac{0.2}{18}\right\}$ Find Fuzzy Cartesian product (i) $\underset{\sim}{S} = \underset{\sim}{A} \times \underset{\sim}{B}$ (ii) $\underset{\sim}{T} = \underset{\sim}{B} \times \underset{\sim}{C}$ Find fuzzy composition of S and T using Max- Min Method, and Max- Product. **OR** How Fuzzy logic can be used in image processing.	[10] [10]
Q2 (b)	Demonstrate design steps in fuzzy controller design with an example: Water sprinkler controller.	[05]
Q3 (a)	Discuss different activation functions used in neural network **OR** Draw the structure of a biological Neuron and explain in detail.	[05] [05]

Q3 (b)	Draw the architecture of Kohenen's self-Organizing map. Explain the algorithm associated with it. Write its applications. **OR** Explain the concept of Support Vector Machine based classifier in detail.	[10] [10]
Q4 (a)	Explain perceptron learning algorithm and develop perceptron network to implement two input OR function. Consider inputs and outputs as unipolar. Assume initial weights and biased values equal to zero. Consider learning rate equal to 1. **OR** i. Consider the following real variables from everyday life: • Income measured in £UK. • Speed measured in meters per second. • A TV show measured in how much you are interested watching it. • A meal measured in how much you like to eat it. • A traffic light measured in what colour is on. In each case, suggest a fuzzy variable corresponding to these real variables. For which of these five variables the use of a fuzzy variable is not really necessary? Why? ii. For the given Fuzzy Sets $\underset{\sim}{A} = \left\{\frac{0.1}{10} + \frac{0.4}{20} + \frac{0.2}{30} + \frac{0.8}{40}\right\}$ $\underset{\sim}{B} = \left\{\frac{1}{10} + \frac{0.9}{20} + \frac{0.7}{30} + \frac{0.6}{40}\right\}$ Determine i) $\bar{A} \cap \bar{B}$ ii) $\bar{A} \cup B$	[08] [04] [04]
Q4 (b)	What is the purpose of defuzzification? Explain different method used for defuzzification.	[07]
Q5 (a)	**Solve any two.** i. Explain Mc Culloch pitts neuron model with the help of example ii. Explain Radial basis function neuron with its mathematical interpretation iii. Explain K-means algorithm with its drawbacks. iv. How does the Maxican Hat network works?	 [05] [05] [05] [05]
Q5 (b)	For the given fuzzy sets $\underset{\sim}{A} = \left\{\frac{1}{2} + \frac{0.5}{3} + \frac{0.3}{4} + \frac{0.2}{5}\right\}$ $\underset{\sim}{B} = \left\{\frac{0.5}{2} + \frac{0.7}{3} + \frac{0.2}{4} + \frac{0.4}{5}\right\}$ *calculate* $(i) A \cup B$ $(ii) A \cap B$ $(iii) \bar{A}$ $(iv) \bar{B}$ (v) Prove any one DeMorgans theorem.	[5]